



Clean Copy of Claims at Issue

5. In an improved process for producing a composite product, said process comprising:

mixing water, gypsum and a cellulosic fiber to form a dilute slurry;

heating the slurry, under pressure, to form acicular calcium sulfate alpha hemihydrate crystals;

substantially dewatering the hot slurry and shaping the dewatered slurry to form a composite product before rehydrating the hemihydrate back to gypsum;

said improvement comprising adding a crystal modifier to said dilute slurry, said crystal modifier is selected from the group of aluminum chloride, and chlorine, to increase the aspect ratio of said hemihydrate crystals.

6. The improved process of claim 5, wherein the aspect ratio of said hemihydrate crystals is increased to at least 5:1.

7. The improved process of claim 5, wherein the amount of crystal modifier is from about 0.05% to about 5% by weight, based on the weight of the gypsum.

8. The improved process of claim 6, wherein the amount of crystal modifier is from about 0.1% to about 1% by weight, based on the weight of the gypsum.

9. In an improved process for continuously producing a composite product, said process comprising:

mixing water, gypsum, cellulosic fiber and alum to form a dilute slurry;

heating the slurry, under pressure, to form acicular calcium sulfate alpha hemihydrate crystals;

substantially dewatering the hot slurry and shaping the dewatered slurry to form a composite product before rehydrating the hemihydrate back to gypsum;

said improvement comprising continuously monitoring the aspect ratio of said acicular calcium sulfate alpha hemihydrate crystals,

when said monitoring indicates the aspect ratio of said crystals is lower than a first selected value, increasing the amount of alum used to form said slurry, the amount of alum being sufficient to increase said aspect ratio to no lower than said first selected value; and

when said monitoring indicates the aspect ratio of said crystals is greater than a second selected value, reducing the amount of alum being used to form said slurry, the amount of alum being sufficient to decrease said aspect ratio to no greater than said second selected value.

10. The improved process of claim 9, wherein said first selected value is at least 5:1.

11. The improved process of claim 9, wherein said first selected value is at least 10:1.

12. The improved process of claim 9, wherein said second selected value is no greater than about 50:1.

13. In an improved process for continuously producing a composite product, said process comprising:

mixing water, alum, gypsum and a cellulosic fiber to form a dilute slurry;

heating the slurry, under pressure, to form acicular calcium sulfate alpha hemihydrate crystals;

substantially dewatering the hot slurry and shaping the dewatered slurry to form a composite product before rehydrating the hemihydrate back to gypsum;

said improvement comprising continuously monitoring the aspect ratio of said acicular calcium sulfate alpha hemihydrate crystals and adjusting the amount of alum used to form said slurry, the amount of alum being sufficient to maintain the aspect ratio of said crystals to at least about 5:1 and no greater than about 50:1.

14. The improved process of claim 13, wherein the amount of alum is adjusted to maintain the aspect ratio of said crystals to at least about 10:1 and no greater than about 50:1.